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ABSTRACT

The chapters of this guide detail some specific aspects of the duties and needs of the beginning college teacher, such as a) the writing of course objectives, b) design of instruction, c) lecture method, d) group discussions, e) laboratory teaching, f) computer-assisted instruction and programmed learning, g) audiovisual aids, h) the teacher's role as evaluator, i) testing, and j) the first class session. An annotated table of contents is presented. (JB)

ED 083194

GETTING STARTED:

A Guide for Beginning College Instructors

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CONTENTS

Chapters	Page
INTRODUCTION	4
ONE. . . . . .WRITING OBJECTIVES. . . . . This opening chapter focuses on the role of objectives in planning instruction. It describes how objectives differ from other sorts of goal statements and how they function to serve you and your students. The chapter will also help you to understand when they are appropriate and when they are not. You'll be presented with guidelines for writing objectives and for identifying well-written ones.	5
TWO. . . . . DESIGNING INSTRUCTION. . . . This chapter focuses on your role in designing instruction, in choosing, when appropriate, an effective sequencing for your material. You'll be introduced to a number of guidelines for structuring your lessons and some specific sequencing materials.	14
THREE. . . . . THE LECTURE METHOD. . . . . This chapter focuses on the potential of the lecture method. Guidelines are presented for preparing, presenting and evaluating lectures. The chapter is concerned with developing a lecturing style. You'll also find suggestions for A-V use and some hints on blackboard techniques.	23
FOUR. . . . . GROUP DISCUSSION . . . . . This chapter focuses on your responsibility in leading discussions. Note the specific roles you plan in directing both the content and process, the "what" and "how" of a discussion. You'll also find some guidelines for starting and structuring discussions and some special tips for handling common discussion problems.	29

FIVE. . . . . LABORATORY TEACHING. 40
This chapter focuses on the potential of laboratory teaching and the problems peculiar to it. The chapter discusses the particular advantages and disadvantages of this method. You'll also be presented with a number of tips for presenting a laboratory class.

SIX. . . . . TEACHING WITHOUT TEACHERS: NEW TECHNIQUES . 44
This chapter focuses on the potential of computer-assisted instruction, programmed learning, algorithms and simulation. The chapter surveys these techniques and discusses their strengths and limitations.

SEVEN. . . . . A-V RESOURCES. 51
This chapter focuses on your role in utilizing A-V materials as an integral part of instruction. Note the eight categories of A-V materials and the different reasons for using them. You'll also be presented with guidelines for selecting and utilizing materials and information on campus A-V facilities.

EIGHT. . . . . EVALUATION - WHAT'S IT ALL ABOUT? 56
This chapter focuses on the function of evaluation and on your role as an evaluator. Evaluation is viewed as a systematic gathering of information for the purpose of making better decisions - whether these decisions are about your own teaching style, your students' performance, or the nature of the instruction itself.

NINE. . . . . A FEW TIPS ON TESTING 61
This chapter focuses on the purposes and problems of classroom testing. Note the different types of testing that are identified and the guidelines for writing preparing and scoring tests. You will also find a discussion on scheduling problems. This chapter stressse the importance of the role you play in creating a climate for testing.

TEN. . . . . THE FIRST CLASS. 69

This chapter focuses on the first class session. You'll be presented with a number of tips for making it run smoothly.

INTRODUCTION

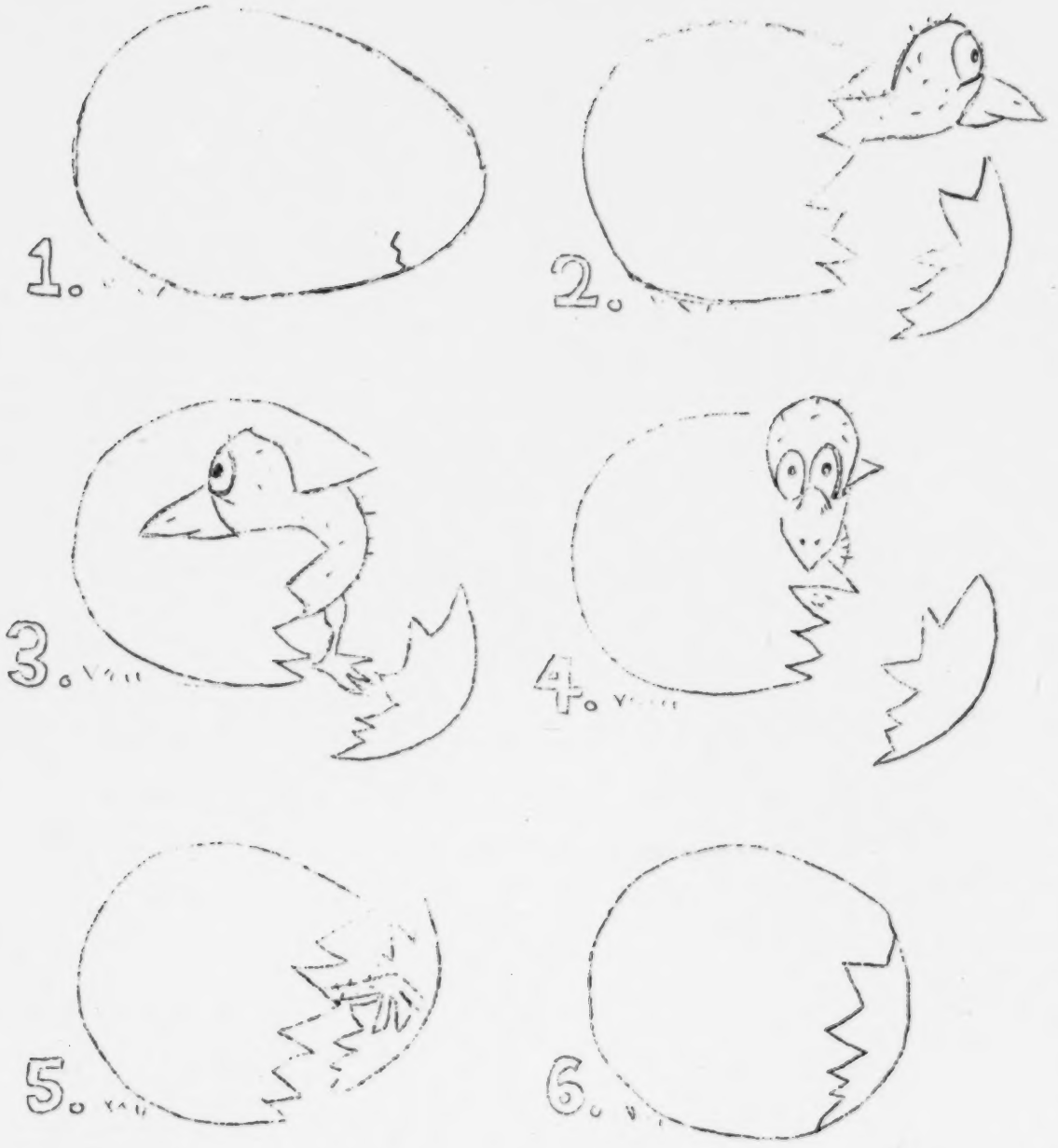
After years of being a student, the switch from student to instructor is apt to be disconcerting. In the transition, many new instructors are tempted to pursue one of two extremes: either they "overteach" and inadvertently smother student response, or they "underteach" to keep from appearing authoritarian to their class. How exactly should you define your role? This primer is designed to help you come to a comfortable definition.

Getting Started relies on some very special definitions of teaching and teachers. Teaching is viewed as the process of facilitating. As an instructor, you facilitate your students' use of learning resources. These resources may be other students' contributions, your own subject mastery, the sort of person you are, or specific materials, such as films, books, etc. A good instructor creates an environment where students can interact with him, each other and the subject matter in an atmosphere that clearly enables those involved to see where they're going.

These definitions do not prescribe any set way that you should teach. That's because there isn't one set way. Depending upon your style, the learning preferences of your students, and the situation, there are any number of teaching strategies that you may use. Each strategy is appropriate in some situations and inappropriate in others.

Good teaching takes many forms. The purpose of Getting Started is not to tell you how to teach, but to present you with a variety of approaches to thinking about your teaching.

"What, Me Teach?"



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Chapter 1- WRITING OBJECTIVES

This opening chapter focuses on the role of objectives in planning instruction. It describes how objectives differ from other sorts of goal statements and how they function to serve you and your students. The chapter will also help you to understand when objectives are appropriate and when they are not. You'll be presented with guidelines for writing objectives and for identifying well-written ones.

> "Would you tell me which way I ought to go from here?"
> "That depends a great deal on where you want to get to," said the Cat.
> "I don't much care where. . ." said Alice.
> "Then it doesn't matter which way you go," said the Cat.
> ". . . so long as I get somewhere," Alice added as an explanation.
> "Oh, you're sure to do that," said the Cat,
> "If you only walk long enough."
>
> Lewis Carroll
> Alice in Wonderland

Unlike Lewis Carroll's Alice, who didn't quite care where she was headed, a new instructor can't be satisfied with just getting "somewhere." There are so many goals possible in any given course that unless priorities are set, time and resources can be easily wasted. This is why it's important to specify objectives. They give direction both to you and your students.

While your department may already have determined the general purpose of your course, it's up to you to specify the short term and intermediate objectives that make learning possible. General

goals indicate what topics will be studied, but they don't indicate how the student should demonstrate what he's learned. You use objectives to provide a picture of what your students should be able to do when they've finished. Your objectives clearly specify what is necessary for mastering your course, realistically considering your students' needs and all the limitations of your teaching situation.

Objectives are designed for students as much as they are for instructors. In fact, to clarify what's going to go on in your course, you might want to hand your students a list of objectives the first day of class. With a clear idea of your goals, they'll be better able to focus their energies. By looking at your list they will have an accurate idea of what's expected of them.

Further, objectives will help both you and your students when it comes time for evaluation. Perhaps you've experienced the trauma of having a professor stress one thing and test another. Objectives help avoid this pitfall. A well-written objective not only spells out what's required of a student, but it also states the criteria that will be used to judge him. With clear cut goals, there is less chance that testing will be irrelevant or unfair.

Below are some typical "objective objections" and a few comments. Maybe you will recognize some of your own thoughts.

-----"I already know my subject pretty well. Why waste time writing objectives?"

It's ironic, but some of the things we seem to know the best, we have the hardest time explaining to others. It's the old problem of being too close to the forest to see the trees. Writing objectives helps you conceptualize your subject and this is an all-important first step in conveying it.

-----"So much of what I want to teach is intangible. How can I possibly write objectives?"

You may not want to write objectives for everything. On many occasions they may prove very helpful in your teaching and in other situations, they may destroy the quality of the educational experience. The whole point of writing objectives is to make you sensitive to what you're trying to do, and you need this sensitivity no matter what you're trying to convey - whether it's knowledge, a specific physical skill or point of view.

-----"Won't I straitjacket myself and my class if I limit myself to a list of objectives?"

Think of objectives as a springboard rather than as a straitjacket. Objectives don't set a maximum amount for what you can do, but they do set a minimum. And this is important. Have you ever completed a course with the nagging feeling that the prof really didn't teach anything? Even with clearcut goals, you run the risk of not accomplishing all that you'd like. And without them, you run the risk of teaching nothing.

Objectives won't stifle your own or your students' creativity. Once you know where you're going, you can be as creative as you like in getting there.

What constitutes a well-written objective? There are three component parts that are usually used in writing objectives. They are guidelines that help you determine whether or not your objectives have done a good job in communicating your intent.

They include:

-a description of what the student should be able to do or produce.
-a statement of the conditions in which the student should be able to do it.
-a statement of the criteria that will be used to judge what he's done.

Together these items present a clear picture of what you are trying to do. But first, let us examine how you would go about formulating each item.

First Component

Your first task is to clearly specify exactly what it is you want your students to do. One well-meaning instructor wrote the following to indicate her goals for an elementary statistics course:

The student should understand the concept of validity.

Unfortunately, this objective did not communicate very much. Exactly what is meant by the word "understand?" Should the student simply be able to define validity? Should the student be able to apply this concept in some way? We are not too sure what the instructor means here. But we do know one thing, if the purpose of an objective is communication, then the language must be clear and concise. Words such as "Know," "Understand," and "Appreciate" are open to a whole range of interpretation. What you need is a specific statement of the behavior you will be looking for in your students. Here is the same objective re-written with this last point in mind. We think you will agree it is clearer:

> The student should distinguish between different types of validity: face validity, predictive validity, concurrent validity, and construct validity.

Remember that your objective need not deal solely with content. You may want to focus on the process of what your students should be able to do. This objective, taken from the same elementary statistics course, demonstrates that point.

> When presented with a hypothetical description of a research design problem, the student should be able to select correctly from all the statistical procedures treated in class that technique most appropriate for the treatment of the data in the problem.

Finally, remember that you cannot peek into your students' minds to measure what they know. You can only gauge what they know by observing what they can do. Be sure to make it clear in your objectives just what behavior you are after.

WORDS OPEN TO MANY INTERPRETATIONS	WORDS OPEN TO FEWER INTERPRETATIONS
to know	to write
to understand	to recite
to really understand	to identify
to appreciate	to differentiate
to fully appreciate	to solve
to grasp the significance of	to construct
to enjoy	to list
to believe	to compare
to have faith in	to contrast

Preceding figure from Mager, Robert F., (1961) Preparing Objectives for Programmed Instruction, San Francisco, California: Fearon.

Second Component

Your second task is to state the conditions under which the student should demonstrate what he has learned. What will your student be given to work with? What will he be limited to using? The following are examples of such situations.

> Given a list of. . . .
> Given any reference material of the student's choice. . . .
> Given a diagram of. . . .
> Given a problem involving. . . .
> Without any reference materials. . . .
> Without the aid of a slide rule. . . .

Here are some examples of what objectives look like when this second piece of information has been added.

> Without the aid of an English-Latin Dictionary, the student will translate selected passages from Ovid's The Art of Love.

> Given a series of prepared slides, the student will identify the following examples of muscle tissues. (List given)

You can see why the addition of this second item is important. It goes one step further in clarifying what behavior you are looking for.

Third Component

Your third task is to state the criteria you will use to judge whether or not your students have achieved the stated objectives. What standards will you use? Do they involve accuracy, speed, or perhaps working within very specific tolerances? Now is the time for you to state what you feel is the minimum acceptable performance for your

objectives. The following are examples of criteria statements.

> . . . .and the student must be able to solve seven out of ten problems in a period of thirty minutes.
>
> . . . .the student will be able to diagram at least 75% of the items on the diagram.
>
> . . . .the student must be able to use the chemical balance well enough to weigh materials accurately to the nearest milligram.

And now, we can take a look at some finished objectives. The three parts of an objective give us a clear picture of what the student should be able to do. The objectives below are specific enough that anyone reading would have a clear idea of what the instructor had in mind.

> Given a legal contract and a list of contract laws, the student should be able to indicate which of the laws are violated by the wording of the contract. The student should be able to cite seven out of ten instances correctly as minimum performance.
>
> The student should be able to translate a magazine article of his own choice from German to English from any one of the following magazines (list given). The article should be approximately 500 words in length. The student may not use a dictionary or any other reference and has a two hour period in which to complete the assignment.

Conclusion

As a final note, remember that the three component parts to objectives serve as guidelines to help you and your students. These guidelines help you know if you have communicated your intentions. You may feel that you can convey your purpose without including all

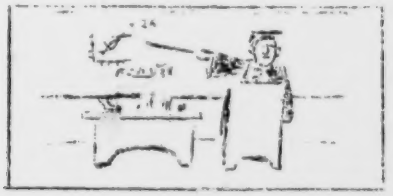
these points. The choice is yours, but the clearer your objectives, the more valuable they are to you and your students.

Suggested Reading:

Mager, Robert F., Preparing Objectives for Programmed Instruction. San Francisco, California: Fearon Publishers, (1961).

CHAPTER 2 - DESIGNING INSTRUCTION

This chapter focuses on your role in designing instruction, in choosing, when appropriate, effective sequencing for your material. You'll be introduced to a number of guidelines for structuring your lessons and some specific sequencing models.



The royal road to learning,
when other roads are barred,
is to take something easy
and make it very hard.

Piet Hein

Your involvement in designing instruction is continuous, from the first long range decisions about where your course will go, to the shorter term, day-to-day decisions on lesson planning. We admit from the beginning that there are no best methods, no proven formulas for designing instruction. It's simply not possible to find a single strategy appropriate to every student and situation. Nevertheless, there are some guidelines that can help you in thinking about planning and presenting your material.

Starting Points

In designing instruction, the obvious starting points are students and subject matter. You'll need to take a critical look at both as a basis for your decision-making. Since you design instruction

with your students in mind, it's important to have an idea of their interests and abilities. What previous knowledge or skills are they bringing to your class? Are most of your students taking your class as a required course or an elective? What course experience do they have in your field? Information like this is invaluable; it helps you decide how to gear your course. The orange cards you receive on the first day of class provide you with a convenient reference for analyzing your students.

You are also concerned with analyzing your subject matter. In a sense, you need to take inventory of your course content. What are the main ideas and skills that you want to develop and what are their component parts? You'll also need to have a feel for the logical structure of your subject. The traditional rules of sequence suggest that you develop your material from known to unknown, from simple to complex, from concrete to abstract, and from observation to reasoning. If you can conceptualize the essential structure of your subject, you have a headstart to teaching it.

Steps in Instruction

Once the very basic issues have been dealt with, you will need some guidelines for presenting material. These guidelines need to fill a double bill. They need to be specific enough that they're useful and general enough that they can be applied to a range of teaching strategies from lecturing to laboratory teaching.

The first step is to outline your goals or objectives for the

lesson. This involves spelling out for your students exactly what you'll expect from them. For some subjects, stating objectives may be inappropriate. In any event, the lesson needs a clearcut sense of direction and stating objectives is one means towards that end. Stating goals or objectives also helps students decide how best to focus their energies.

The second important step is to relate the lesson to previous learning. Your students need a framework for what they'll be learning. You might want to introduce your topic in a very general way and tie it into material they've already mastered. ("I think you will see where these ideas fit into yesterday's discussion.") The material won't seem so strange and this will give your students an added confidence in dealing with material. This will also give them an edge in remembering it. Sometimes you'll find that what you teach doesn't build on past lessons. Perhaps the material isn't familiar but the processes used in learning it are (concept building, problem solving, etc.) In that case, give an overview of how you're going to develop the topic.

Third, you'll also want to make sure that you give feedback to your students. Your students need to know how well they are doing. Your reactions will help them gauge how much and how well they've learned. This feedback takes many forms from grades to questions and comments, even to non-verbal cues.

The need to assess performance, your own and your students, is the fourth critical step. You evaluate your students for many reasons-not

the least of which is so you'll know where you need to adjust your teaching. Your students also need a chance to confirm what they know. Assessment extends to a variety of situations from direct observation to formal testing. (Chapters 8 and 9 deal with evaluation and testing at greater length.)

The fifth step is to generalize the lesson to future learning. Once again you're concerned with creating a framework for your students that will provide a useful means to help them to analyze and synthesize material. You will want your students to relate the ideas from your course to other ideas in the field and in related fields.

Finally, the sixth step is to be sure that you provide practice situations. Learning isn't a one shot affair. It's not enough that your students are exposed to an idea or skill, that doesn't guarantee that they'll remember it or even know how to apply it. They need a simulated or actual situation where they can demonstrate to themselves and to you what they've learned.

Models for Sequencing

There are any number of teaching-learning models you can use. The advantages of models like these is that they break down broad areas of learning into smaller, component parts. The two that are presented here provide you with convenient steps for sequencing instruction. Each step is progressively more complex and is therefore dependent on the preceding one. You can use these models to plot where you're going and to determine what the prerequisite steps are. However, by no

means feel that you have to limit yourself to these models. You may want to hunt for one that's better suited to your needs.

The first model is Bloom's Taxonomy. In the last chapter we stressed the importance of objectives. This model classifies a broad range of learning outcomes into six major categories of objectives. The lowest level in this taxonomy begins with the student's recall of knowledge. It extends through his comprehension of this knowledge to his skill in the application of it in novel situations. The next levels progress from the student's ability to make an analysis of situations involving this knowledge to his ability in the synthesis of it into new conceptual schemes. The highest level of the taxonomy is evaluation which involves the student in assessing the value of the knowledge in a particular context.

You may want to use this model to spot check your own course objectives. Traditionally, college teaching has concerned itself practically with the three lower levels and pretended to be concerned with the three upper ones. When you spot check your objectives, you'll be able to see if you have put undue emphasis in any one area.

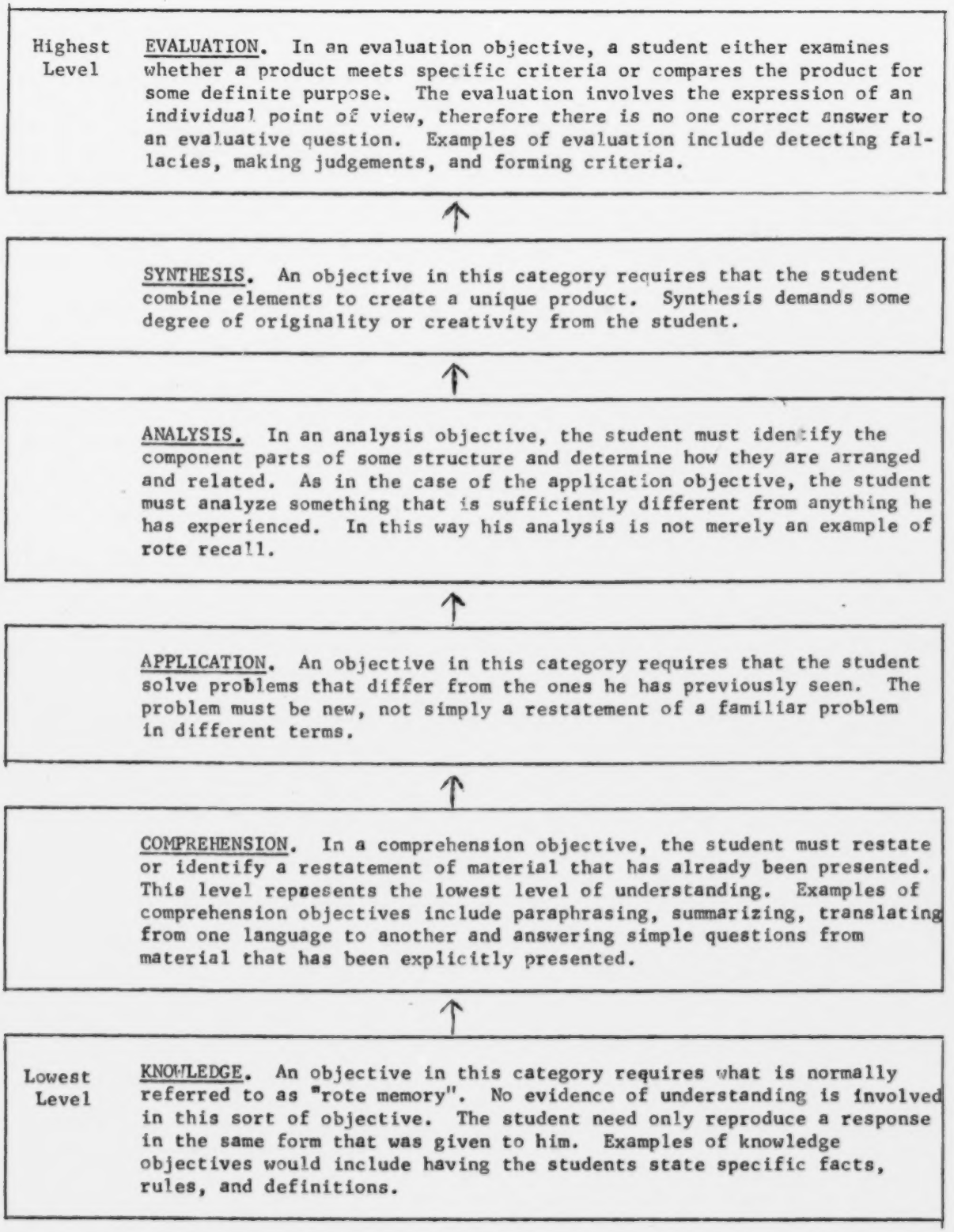

Highest Level
EVALUATION. In an evaluation objective, a student either examines whether a product meets specific criteria or compares the product for some definite purpose. The evaluation involves the expression of an individual point of view, therefore there is no one correct answer to an evaluative question. Examples of evaluation include detecting fallacies, making judgements, and forming criteria.
SYNTHESIS. An objective in this category requires that the student combine elements to create a unique product. Synthesis demands some degree of originality or creativity from the student.
ANALYSIS. In an analysis objective, the student must identify the component parts of some structure and determine how they are arranged and related. As in the case of the application objective, the student must analyze something that is sufficiently different from anything he has experienced. In this way his analysis is not merely an example of rote recall.
APPLICATION. An objective in this category requires that the student solve problems that differ from the ones he has previously seen. The problem must be new, not simply a restatement of a familiar problem in different terms.
COMPREHENSION. In a comprehension objective, the student must restate or identify a restatement of material that has already been presented. This level represents the lowest level of understanding. Examples of comprehension objectives include paraphrasing, summarizing, translating from one language to another and answering simple questions from material that has been explicitly presented.
Lowest Level
KNOWLEDGE. An objective in this category requires what is normally referred to as "rote memory". No evidence of understanding is involved in this sort of objective. The student need only reproduce a response in the same form that was given to him. Examples of knowledge objectives would include having the students state specific facts, rules, and definitions.

Fig. Bloom's Taxonomy of Cognitive Objectives

The second model, the Cumulative Learning Model, suggests a pattern for the development of learning. Obviously, if we had a clearer conception of what processes are involved in learning, we'd have a better idea of what strategies to use in teaching. There are five learning structures defined in this particular model: signal learning, chain learning, multiple discrimination, concept formation, and principle formation. Some researchers recognize only three of these structures (chaining, multiple discrimination and concept formation), while others, like Gagne, have expanded the model to recognize eight "conditions" of learning. Whichever version you choose, you'll find an aid in the essential task of thinking about learning. Here, too, you want to examine your lessons with an eye to an undue emphasis on any area.

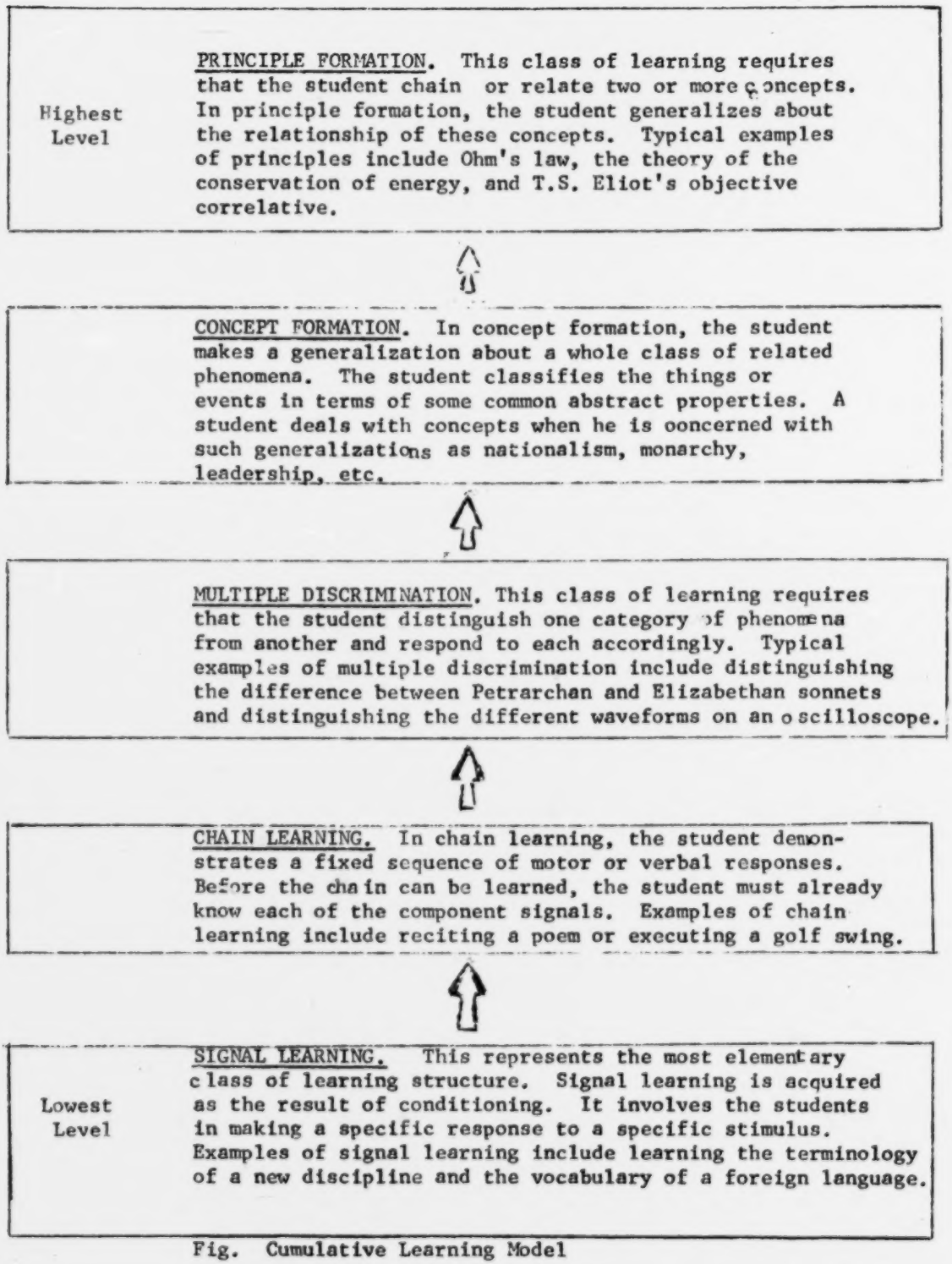

Highest Level
PRINCIPLE FORMATION. This class of learning requires that the student chain or relate two or more concepts. In principle formation, the student generalizes about the relationship of these concepts. Typical examples of principles include Ohm's law, the theory of the conservation of energy, and T.S. Eliot's objective correlative.
CONCEPT FORMATION. In concept formation, the student makes a generalization about a whole class of related phenomena. The student classifies the things or events in terms of some common abstract properties. A student deals with concepts when he is concerned with such generalizations as nationalism, monarchy, leadership, etc.
MULTIPLE DISCRIMINATION. This class of learning requires that the student distinguish one category of phenomena from another and respond to each accordingly. Typical examples of multiple discrimination include distinguishing the difference between Petrarchan and Elizabethan sonnets and distinguishing the different waveforms on an oscilloscope.
CHAIN LEARNING. In chain learning, the student demonstrates a fixed sequence of motor or verbal responses. Before the chain can be learned, the student must already know each of the component signals. Examples of chain learning include reciting a poem or executing a golf swing.
Lowest Level
SIGNAL LEARNING. This represents the most elementary class of learning structure. Signal learning is acquired as the result of conditioning. It involves the students in making a specific response to a specific stimulus. Examples of signal learning include learning the terminology of a new discipline and the vocabulary of a foreign language.

Fig. Cumulative Learning Model

Conclusion

What we have done in this chapter is to provide a guide to help you get started with instructional sequencing. Now the focus is on you. The models we have presented are by no means exhaustive. You may want to dig further for models that are more relevant to your specific needs. In any event, a model is only as effective as the uses to which you put it.

SUGGESTED READINGS:

Gagne, R.M., The Conditions of Learning, Holt, Rhinehart and Winston, New York, 1965a.

Popham, James W. and Baker, Eva L., Planning an Instructional Sequence, Prentice Hall, Inc., Englewood Cliffs, N.J., 1970.

Popham, James W. and Eva L., Systematic Instruction, Prentice Hall, Inc., Englewood Cliffs, N.J., Pages 63-89.

Weigand, James E., Developing Teacher Competencies, Prentice Hall, Englewood Cliffs, N.J., 1971.

CHAPTER 3 - THE LECTURE METHOD

> This chapter focuses on the potential of the lecture method. Guidelines are presented for preparing, presenting and evaluating lectures. The chapter is concerned with developing a lecturing style. You'll also find suggestions for A-V use and some hints on blackboard techniques.

Many instructors dismiss the lecture method as an educational antique, a throwback to the times when we didn't know any better. Others feel the teaching method requires no particular training or skill. Looking back, we see that the method has always had its share of critics. Even in 1766, Samuel Johnson was quoted by Boswell:

> People nowadays have got the strange opinion that everything should be taught by lecture. Now I cannot see that lectures do as much good as reading the books from which the lectures are taken.

Yet hearing a lecture can be a very different experience from reading a transcript of the same material. The content may be the same, but the process is different. You may remember lectures from your own undergraduate experience. If the lecturer was good, even if you've long since forgotten his content, you remember being caught up in his thought process. The lecturer provides a model for thinking through an idea. And this model is as important, if not more so, than any content that is presented. Your students will not only hear an idea, they will also witness its development.

Therefore, the focus is on you. As an instructor, how can you develop an effective lecture?

Preparing the Lecture

Obviously enough, a good place to begin is by analyzing your topic carefully and specifying objectives for yourself and your students. What are you trying to communicate? What are your main ideas? How relevant is your supporting evidence? What sorts of questions will best help your students?

Remember that most students will not have your level of sophistication with the subject matter. Your students may not see where the material fits into other ideas, how it will be used and why it is important. It is your job to help them join these links.

A statement of objectives can be most helpful here. Objectives help the instructor (and student) organize the ideas in his own mind. Objectives are useful tools not only in planning but also in presenting the lecture. Introducing the lecture with a statement of your objectives helps the student organize what he is about to hear. He has a better idea of what to listen for and both you and the student have a framework to build upon.

Presenting the Lecture

You can't overemphasize the need to structure what you present. You won't be stealing from the students by doing this nor will you be relieving them of their responsibility. They still have to synthesize the material, examine and expand it. By structuring the material, you facilitate your students' learning. The material is difficult enough; an instructor's methods shouldn't complicate it further.

Your job then is to decide what sort of structuring is relevant. An effective lecture, no matter how complex the topic, follows this simple pattern.

-First, it states what it's going to state.
-Then it states it.
-Finally, it restates or summarizes what's been said.

Don't worry that you'll be bogged down in repetition. Restating your ideas reinforces them in the students' mind and gives you the chance to expand them.

Point 1. When introducing the lecture, begin with your objectives or purposes. You may want to simply state them, write a brief outline on the board or possibly give your students a handout. The handout has an additional value as a tangible aid for review.

Point 2. It is good to preface the lecture with material the students are already comfortable with. Perhaps you will want to give or solicit a brief resume of the previous lecture. This helps not only from the standpoint of continuity, but it also promotes confidence in dealing with the new material.

Point 3. When you are delivering your lecture, remember that not only your words but also your body language make the statement. Students note changes in voice quality, facial expressions and general gestures. They take these as cues to either tune in or turn off. Emphasize main points by speaking more slowly and changing your voice. It is not necessary to give a dramatic reading of your notes, but it is important to convey your own involvement with the ideas you present. In any

event, the style you evoke has to be a natural expression of yourself.

Point 4. Remember that visual aids play an important part in presentation. Most classrooms have a blackboard, but you may find films, filmstrips, models or charts that are helpful. An effective visual aid provides a reference point for the discussion; it helps focus attention. And frankly, it provides both you and your students with a welcome rest from looking at one another's faces.

The blackboard is probably the most common aid. Remember a few simple techniques.

1. Write down complete statements not just symbols. Students tend to copy down just what you write and later wonder what you meant. Your notes should help recollection, not hinder it.

2. Start at the top of one panel, move down and then go up to the next. Do not skip around and do not erase a panel until all available ones are used.

3. If you are right-handed, why not start with the right-handed panel, (as seen by the class) and when this is full, move to the left. This insures that you will not stand in front of what you have written.

Point 5. In summarizing the lecture, questions you pose can be extremely helpful. They remind students of material they should have gained and what implications they should consider. Questions help the student structure what he has heard on the topic, in that particular lecture and cumulatively. At the end, it is also useful to review concepts, noting how they relate to each other and to previous ones.

Evaluating the Lecture

Unlike some European universities, where students applaud, hiss or shuffle their feet to indicate their evaluation of a lecture, instructors here must rely on different techniques for getting feedback. Depending on what aspect of the lecture you want to evaluate, there are any number of strategies that you can use. Perhaps you want to assess your lecturing style. Early in the semester you may want to hand out a very simple questionnaire asking your students to anonymously rate aspects of the lecture such as overall organization, clarity of explanation, audibility, etc. The questionnaire should also provide space for any additional comments your students may want to make. Although this technique does not reveal what or how much is being learned, it nevertheless provides you with a very important sort of feedback. A videotape recording of one of your lectures can also serve this purpose. You can play the tape back at your leisure and experience your style as others do, analyzing points in your presentation. The videotape recorder offers an unusual opportunity for self-study and self-evaluation.

Or perhaps you want to assess student learning from your lectures. You might want to give one or two quizzes which your students will take anonymously. The pattern of student responses can be very helpful in determining just where your explanations need to be clearer or more fully developed.

In addition to these techniques, you can always solicit feedback

in the informal give and take of classroom discussion, by keeping an open line for questions and comments or reserving a few minutes at the end of the class for a critique of what has gone on. Whether you choose to rely on an informal assessment of your lecturing or a more formal technique, do not underestimate the need for feedback.

Conclusion

A student could just as well read a lecture in a book or see the same message on film. So why is the lecture method still alive? The lecture gives the student a chance to witness a mind at work. As a lecturer, you not only present your subject matter, you project a model of a thinker, a researcher, in short, of a learner.

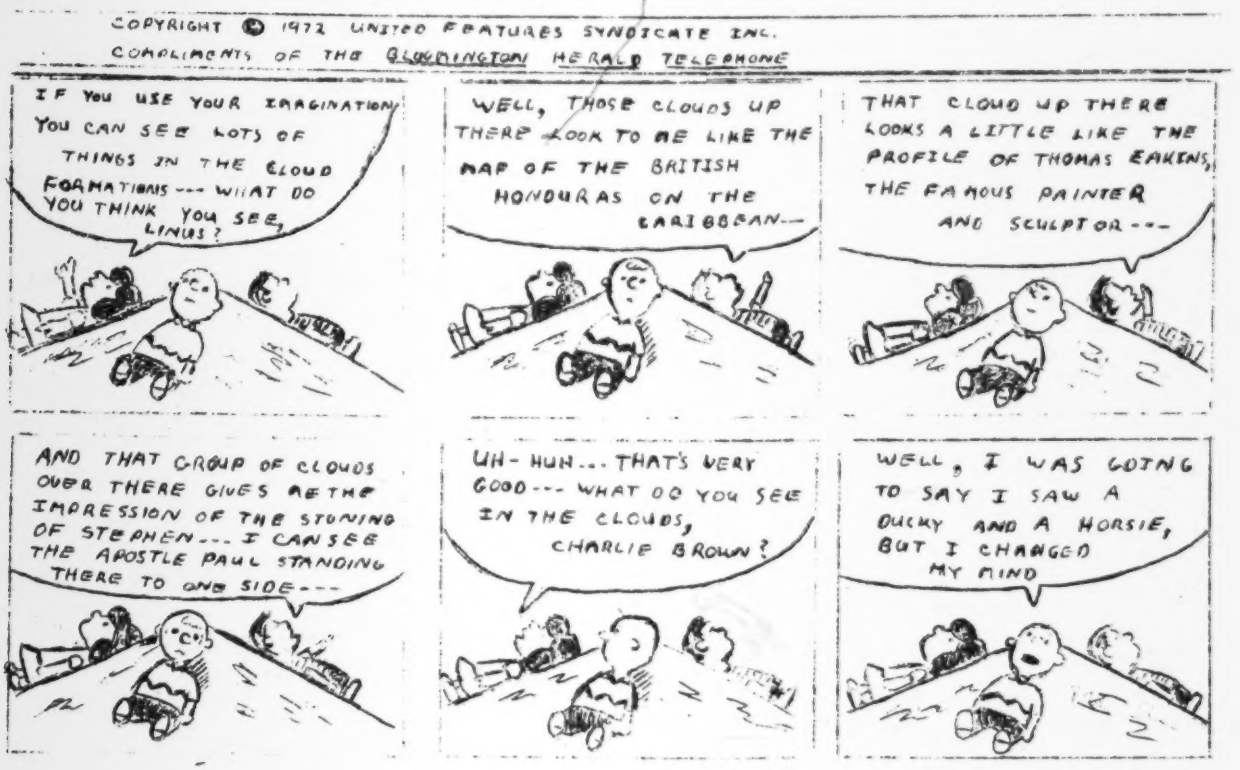
Suggested Readings:

Beard, Ruth, (1970) Teaching and Learning in Higher Education, Penguin Books.

Bligh, Donald A. (1971) What's the Use of Lectures, University Teaching Methods Unit, London.

CHAPTER 4 - GROUP DISCUSSION

This chapter focuses on your responsibility in leading discussions. Note the specific roles you play in directing both the content and the process, the "what" and "how" of a discussion. You will also find some guidelines for starting and structuring discussions and some special tips for handling common discussion problems.


COPYRIGHT © 1972 UNITED FEATURES SYNDICATE INC.
COMPLIMENTS OF THE BLOOMINGTON HERALD TELEPHONE
IF YOU USE YOUR IMAGINATION YOU CAN SEE LOTS OF THINGS IN THE CLOUD FORMATIONS --- WHAT DO YOU THINK YOU SEE, LINUS?
WELL, THOSE CLOUDS UP THERE LOOK TO ME LIKE THE MAP OF THE BRITISH HONDURAS ON THE CARIBBEAN---
THAT CLOUD UP THERE LOOKS A LITTLE LIKE THE PROFILE OF THOMAS EAKINS, THE FAMOUS PAINTER AND SCULPTOR---
AND THAT GROUP OF CLOUDS OVER THERE GIVES ME THE IMPRESSION OF THE STONING OF STEPHEN --- I CAN SEE THE APOSTLE PAUL STANDING THERE TO ONE SIDE---
UH-HUH... THAT'S VERY GOOD --- WHAT DO YOU SEE IN THE CLOUDS, CHARLIE BROWN?
WELL, I WAS GOING TO SAY I SAW A DUCKY AND A HORSIE, BUT I CHANGED MY MIND

A discussion is a little like steam - either it's a moving force or a lot of hot air. Your role is what makes the difference, and it's one that demands a great deal of skill and sensitivity. Have you ever sat in on a discussion that bogged down, strayed far from the point or never really seemed to have one? Then you know that good discussions don't just happen. Even the most spontaneous

discussion has a subtle direction behind it.

Physical Setting

Your first concern is creating a climate for discussion. How can you create an atmosphere in which your students will feel free to express themselves? A great many things are involved - not the least of which is the physical setting of the discussion. Your students can't concentrate on what's being said if they're muttering about the lighting, heating or soundproofing of the classroom. Of course you don't have much control over what room you're assigned, but you can check these problems out before class period.

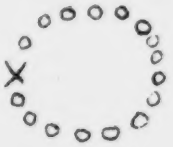
Seating is also a prime consideration, and it can do a great deal to either facilitate or hinder what goes on in your classroom. The traditional rule of thumb is to make sure that all the students are clearly within the instructor's range of vision. Yet it's just as important that students have a clear view of one another. Communication is equally a function of what we can see (gestures, facial expressions, etc.) as well as of what we can hear. Remember that you can manipulate seating to foster any number of effects from closeness to conflict. For example, an instructor may intentionally choose a particular seating arrangement to underscore the tension in a particular discussion topic. There are any number of ways to arrange seating, so you'll want to solicit suggestions from your students.

Teacher's Desk

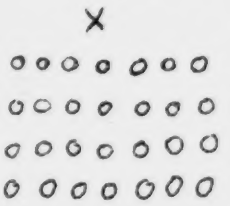
Which of these classroom seating arrangements would you find the most and the least comfortable if you were a student? If you were a teacher?

Setting One

Setting Two

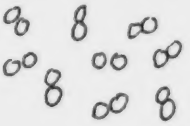


Setting Three

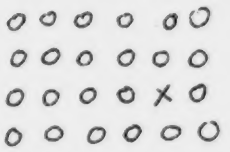


Setting Four

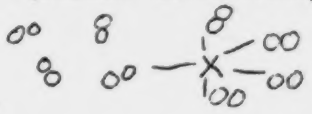
Setting Five
(no teacher)



Setting Six



Setting Seven
(teacher moves freely)



X = Teacher

0 = Student

Either as student or teacher most subjects said they would feel most comfortable in setting four. Many of them also picked settings three and seven as most comfortable.

In the least-comfortable category, most picked settings six and one, both as student and as teacher. And, despite the general popularity of settings seven and four, many thought that these settings would be uncomfortable for students.

Theorizing that the choices relate to a person's need to be controlled by or to control others, the researchers say they expected setting six to be a least-comfortable choice since it creates ambivalence for both teachers and students. "The setting is one of high teacher control although the teacher is not in a traditional teaching position," they say. And the arrangement does nothing for those students who want to control other persons, since "it does not facilitate either student-student or student-teacher interaction."

There were a couple of surprises. Though they expected setting five to be selected overwhelmingly as the least comfortable, it "was not selected for any consistency worth noting." They speculate that "the notion of a learning situation without a teacher is not even considered as feasible," despite a trend toward independent study and individual instruction.

A bigger surprise was the selection of setting one as a least-comfortable choice. It was surprising, they say, because "the concept of students working in small groups with the teacher helping as needed would appear as one which is desirable and often used, "particularly in science laboratory work. One possible explanation is "the belief that students working without the direct assistance of the teacher are not efficient."

Feitler and his colleagues say that more studies of this sort are needed because "the traditional classroom setting-the teacher in front of a class in neat rows - is undergoing significant if not revolutionary changes."

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Psychological Setting

As important as the physical setting is, the psychological setting you create has an even more profound effect on what will happen in discussion. Your reactions, your responses to students, the attitudes you project in your actions - all suggest to your students the sort of interaction they can expect. From the first day, your students will be looking for clues as to what you and your class will be like. The way in which you field students' comments will give the most important clue. No one wants to feel that his remark will be put down or put off. Students are also sensitive to what they think their instructor really wants. Does he want a discussion or a chance for his own extended monologue? Does he say he wants disagreement and then get defensive when someone challenges him? Your students will try to read you so that they can respond appropriately. Be sensitive to the clues you give them.

WHAT DO YOU DO IF*; . . . . .there's a lull in the discussion? Relax. This doesn't mean you've failed. Every conversation needs a chance to catch its breath. It may mean that your topic's exhausted or it may be a pause for people to digest what they've heard. If the lulls come too frequently, though, you may need to give more attention to the types of topics you're picking; they simply may not be broad enough, not offering room for discussion.

*What Do You Do "IF?". . . .

Unfortunately there are no easy answers. A specific situation may be far more complicated than it looks on the surface - or it may be very different from what you perceive. Nevertheless, here are some factors you may want to consider.

Getting Started

New instructors often wonder how there can be possibly enough to say to fill the class period. However, this will be the least of your worries. Your job is directing and moderating the discussion, not doing all the discussing. Often there is a tendency to over-manage the situation. Remember that the discussion isn't just a matter of your communication with your students; it's a chance for your students to share ideas and pool resources. Many instructors overlook this potential and end up trying to carry the whole conversation themselves.

There are any number of techniques you can use in opening up discussion. The most obvious is to draw on students' questions and comments and to enlarge upon them with your own remarks. However, this may not always be applicable. What do you do if the subject matter is new and your students are too? You may want to jot down several statements or questions beforehand and use these as the springboard. Remember, though, that the use of too many pre-determined questions may inhibit rather than stimulate exchange. You've probably heard the professor who's spieled off a list of questions that required only brief factual replies and little student involvement. The result could hardly be called a discussion. You'll want to ask them the sort of question that will draw students out and actively involve them. You might also want to encourage your students to ask questions of one another. Above all, you must convey to your students that their ideas will be valued as well as welcomed.

Many instructors are over anxious about the degree of participation

in discussion, so it's important to know just how you view participation. Some still view it as the number of hands raised or the number of comments crammed into a forty-five minute period. Of course there are patterns you'll want to consider. If one person enters the discussion, is he followed? Do a few students tend to monopolize? Does the class as a whole encourage its members to participate? All these questions are certainly important, but don't overlook some deeper issues. How much are your students involved in the basic decision-making? Can they decide what gets discussed and how? These are questions that will need your attention.

WHAT DO YOU DO "IF". . . . . there's a student who monopolizes?

Unfortunately many students feel that they must make a certain quota of comments to make the grade. There are many other causes at work, but the end result is a great deal of tension. You don't want to reject the one student, but then you don't want to alienate the rest of the class. You may want to take one of two approaches. Either you can use his comments to throw the discussion back to the class, ("You've raised a point. Maybe others would like to comment.") or you can acknowledge the comments and offer another outlet ("Those ideas deserve a lot more time. Maybe we can discuss them after class.")

Structuring the Discussion

Your responsibility here is dual. You're concerned not only with content, but also with the process of interaction. This may cast you into any number of roles. At times you'll need to clarify what's been said. You'll need to restate what the class is considering or translate some student's poorly worded statement into a clearer one. ("That's an

interesting idea. Let me see if I understand what you're saying. . ."). Your perspective of the topic will put you in a good position to clarify, but exercise caution, because translating someone else's ideas is always a sensitive task. Your students are naturally afraid of looking foolish, so be sure to reword ideas carefully.

You'll also need to elaborate many points in the discussion. There are many times when it's relevant to enlarge on something that's been said or to give examples. If you don't know something feel free to admit it. An honest admission can do a great deal to create a more open and relaxed atmosphere. At times you may also want to throw the questions back to the class. ("John's got an interesting question here. Do any of you want to respond?") This isn't a cop-out on your part and it is a way of getting your students more involved with one another.

Your class will also need your help to orient the discussion. Both you and they may want confirmation on where you are and where you are headed. ("I think we're straying from the point here." "Is this a topic you'd like to explore further?") This sort of direction keeps the discussion on the track, but it by no means limits you to one destination.

Many times there will be a need to summarize what's been said. You may want to do this yourself or have your students do it. Summarizing gives a sense of closure and definiteness to what's been said. It also gives you a chance to extract key comments and pull them together.

Of course you'll be interested in keeping the communication channels open and this demands special attention. You'll often find yourself playing the role of gatekeeper. Sometimes this may mean encouraging

participation. ("John, you've been wanting to react to Ed's idea.") It may also involve imposing some sort of regulation on the communication flow. ("Time's running short, so let's limit the length of comments and we'll pursue this next time if you feel it's necessary.")

Throughout the discussion, you will juggle between being both a participant and an observer. At times you'll want to step back from the situation and view what's happening. You may not always have a ready remedy, but you'll need to become a good diagnostician.

WHAT DO YOU DO "IF". . . . . there's a student who's always quiet?
Naturally you're concerned about the silent student: is he confused or simply turned off? Watch for clues that indicate he wants to speak up. ("Allen you seemed disturbed by Dan's idea. What do you think?") However, be careful that you don't embarrass a student into participating. You may want to make a point of talking to this student before or after class to indicate your interest.

Conclusion

You're concerned with process as well as progress. Both you and your students will be evaluating what goes on. It will be fairly easy to tell if your students have grasped the direction of the discussion; their questions and comments are a good index. It will be much more difficult to assess the process. Are more students feeling free to contribute? There are many questions you'll want to ask yourself. . . and your students.

As one final note, Ben Franklin had some sage advice on the topic of discussion. "The Wit of Conversation lies less in showing it yourself

than in bringing it out in others." So much for sage advice: you'll find that your own intuition and insight will be your most important aids.

YOUR MANY ROLES IN LEADING DISCUSSIONS. . .

Initiating - suggesting new ideas or a novel of looking at what you're discussing.

Information Seeking - asking for relevant facts or authoritative information on a subject.

Information Giving - supplying relevant facts or relating personal experiences.

Opinion Giving - stating an opinion about something the class is considering

Clarifying - restating something that someone has said. Translating a poorly worded statement into a clear one.

Elaborating - building on previous comments, giving examples.

Co-ordinating - extracting the key ideas from what's been said and integrating them.

Orienting - defining where you think the class is in their discussion and where you think they have to go.

Testing - checking with your class as to where they feel the discussion should be going.

Summarizing - reviewing what's been said, pulling together ideas and comments.

Gatekeeping - making sure that everyone who want to gets a chance to speak.

Encouraging - being receptive and responsive to comments.

Standard Setting - supplying criteria for considering the different ideas that are discussed.

Relieving Tension - diagnosing what causes frustration during discussions and trying various remedies.

SUGGESTED READINGS:

Phillips, Gerald, Communication and Small Groups, Bobbs-Merril, Indianapolis, 1966.

Potter, David, Discussion: A Guide to Effective Practice, Wadsworth, Belmont, California, 1969.

CHAPTER 5 - LABORATORY TEACHING

This chapter focuses on the potential of laboratory teaching and the problems peculiar to it. The chapter discusses the particular advantages and disadvantages of this method. You'll also be presented with a number of tips for presenting a lab class.

Laboratory teaching has its hardships, but many instructors insist that the experience is priceless - for themselves as well as their students. Of course, teaching a chemistry lab makes different demands from a biology or physics section; nevertheless, it's possible to generalize some of the experience of all three instructors. Note too, that laboratory teaching is not restricted to the physical sciences. The lab method can be used in any sort of teaching that emphasizes direct experience and experimentation. (A prime example is the T-group lab used in human relations training.)

The laboratory experience is essential because it bridges the gap between the theoretical and the technical. Given this perspective, laboratory teaching in the sciences has traditionally had three objectives. The first involves the students' acquisition of specific psycho-motor skills (preparing an agar plate, setting up a gas collection apparatus, etc.). The second objective is that the students master the process skills of science (observing, inferring, stating hypotheses, designing investigations, etc.). And the third objective is that the student obtains concrete experience with abstract ideas (measuring free energy, angular momentum, etc.). On a more personal

level, the lab experience is valuable because it gives the student an involvement, a more intimate identification with his discipline. Laboratory work also recognizes the social dimension of learning - an aspect often neglected in other teaching situations. The tasks encourage teamwork, an interaction between students and students and staff and students.

From the instructor's point of view, this interaction makes for a very special sort of teaching. The instructor here has an unusual degree of involvement with his students' learning. He is able to observe students at work and give help where it is needed. The chance to give individualized instruction is a luxury in most teaching situations. For those who will be teaching in audio-tutorial labs, this opportunity is multiplied. These labs are set up with carrels equipped with casettes and slide or film strip projectors. The carrels provide a resource for students who want to review or reinforce technical aspects of the lab. The carrels free the instructor so that he can give even more intense individualized instruction.

For all its advantages though, lab teaching is certainly not without its share of problems.

Problem One. The most obvious concern is the safety hazard. At first an instructor may feel somewhat like a safety cop. However, safety checks soon become so routine that they need not distract student or instructors.

Problem Two. Another problem is knowing how much and what sort of instruction to give, whether in verbal directions or in the lab handouts.

the problem here is to avoid telling so much that the interest is lost and so little that students do not know what to do. This point is a particularly important one and we will tackle it later.

Problem Three. A third problem involves preparing the students for the labs. Many times the impact of a lab is lost because students lose time and interest while trying to familiarize themselves with new procedures and equipment. How can time spent in the lab be maximized? Audio-tutorial labs provide one answer to this question. Special carrels can be permanently set aside with materials pertaining to the upcoming lab. Students can then study these at their leisure. Handouts and suggested readings provide another approach to preparation. You may also want to set aside the last few minutes of each lab to introduce the next lab and relate it to previous work.

Structuring the Lesson

Beyond your part in setting up the experiment, your main task is deciding how to present the material most effectively. If you have gone to the trouble of creating an experience for your class, it is essential to work with them in dealing with it. Your explanations will usually either help or hinder this end.

There are six items in particular that you will want to include in your initial explanation of the lab. These items provide the spring board for additional comments and questions.

Introduction - a concise statement of the purpose of the experiment, tying it in to past experiments and relating it to any relevant research. The lab lessons

build on one another and it is important that you stress this continuity.

Scheduling - information that will enable the student to coordinate the lab with the course of study.

Time Required - information on the approximate time different tasks will take so that students can pace themselves.

Materials - a listing of the materials involved and an explanation of their usage.

Precautions - a description of any difficult procedures and safety precautions.

Laboratory Hints - helpful information, sample data, the derivation and use of any typical formulas and calculations of sample lab problems.

This initial presentation is important, but perhaps nothing will be as important as the time you spend with individual students. The fact that you are available does not necessarily mean that your students find you accessible and easy to communicate with. You will want to give special thought to this and to the questions and comments you can make which will be most helpful.

Conclusion

The ancient words of Confuscius provide one final note to what's already been said.

I hear and I forget
I see and I remember
I do and I understand.

Suggested Reading:

Beard, Ruth (1970), Teaching and Learning in Higher Education, Penguin Books, London.

Posttelhwaithe, S., et al. (1969), The Audio-Tutorial Approach to Learning, Burgess Publishing Company, Minneapolis.

CHAPTER 6 - TEACHING WITHOUT TEACHERS: NEW TECHNIQUES

> This chapter focuses on the potential of computer-assisted instruction, programmed learning, algorithms and simulation. The chapter surveys these techniques and discusses their strengths and limitations.

The title may seem a bit disconcerting; after all, if you are interested in teaching, why learn about "teacherless techniques? . The answer is simple. Techniques such as computer assisted instruction, programmed instruction, algorithms and simulation can extend your capabilities as an instructor. By freeing you from certain teaching tasks, they allow you to concentrate your time where it's needed most. These techniques give you more time to facilitate interaction, to relate to your students' needs. These techniques also involve your students in a very special way. They force the student to take responsibility for his own learning, to pace himself and assess his own progress. Whether or not you experience all of these in your teaching, an exposure is still valuable.

Computer Assisted Instruction (CAI)

> The computer has touched off a storm of fresh ideas about man as an interacting part of larger systems, about his physiology, the way he learns, the way he remembers, the way he makes decisions. Virtually, every intellectual discipline. . . .has been hit by a wave of imaginative hypotheses triggered by the invention and diffusion of the computer. . . (It) has raised the rate of knowledge-acquisition to dumbfounding speeds.
>
> Alvin Toffler
> Future Shock

CAI can take a variety of forms but the basic presentation is always the same. The subject matter, or program, is presented to the student on a display unit such as a typewriter or a cathode ray screen. The student scans the program and indicates his readiness to start by pressing a switch. The computer then presents material at a rate the student determines. The program itself is a carefully constructed sequence of items. It breaks the subject matter down into manageable bits which the student must master, piece by piece, before he can go on. The program includes questions which the student answers, usually on the typewriter or by pointing to various locations on the cathode ray screen with a light pen. The computer then records and analyzes the responses and presents the students with prompt feedback.

It is no wonder that CAI has created so much excitement. From the instructor's point of view, CAI is a tremendously efficient technique. Not only can one computer be hooked up to service a number of different locations, but also, through time-sharing, it can accommodate a number of different students at once on an individual basis. Students generally like CAI because it provides immediate feedback and reinforcement at every step of learning. He knows right away whether he is correct, incorrect or on the right path. Another advantage of CAI is that it is tireless in its monitoring drills and practice remedial work.

However, for all its good points, there is a danger that CAI will be considered a panacea, capable of curing every ill. In response to this some feel that CAI is tremendously over-rated. Those who have little understanding of the reality of CAI potential recognize only that

it is extremely expensive. To be sure, CAI is still in the research stage. There seems little doubt that it can do many instructional jobs very effectively, but until it's shown to be cost effective, it will not have widespread use.

Program Instruction

> From experimental studies made so far the evidence is that programmes are at least as effective as teaching of the same content by an expert teacher, and it takes as little as two thirds the time for average students to cover the same ground.
>
> Ruth Beard
> Teaching and Learning
> in Higher Education

Programmed instruction (PI) has an obvious kinship to CAI. Both use programmed materials which have been carefully sequenced, utilizing various reinforcement schedules. However, where CAI uses the computer, PI used either a teaching machine or a special text.

The real strength of programmed instruction, and of any programmed material, is that the students can move at their own pace. A problem in individualizing instruction is that it makes the instructor a juggler, trying to balance the many needs of a class full of students. PI can help accomplish what might otherwise be impossible. PI also requires that the student use a logical sequence of thought. This gives the student a sense of the structure of the topic. However, PI has also received criticism for this. Many fear that such structure straitjackets the students and keeps them from thinking creatively. Beard (1970) suggests that this is not a real danger. Obviously, the decision to use programmed materials depends upon the content, conditions and goals of the particular instruction.

You said that amplifying a microwave means to increase the size of the oscillations. Good! You are correct!

Just to be sure that you understand the two functions of a Klystron, see if you can answer one more question.

Klystrons that generate microwaves are called:

(a) amplifiers. . . . . .turn to page 23
(b) oscillators. . . . . .turn to page 24

Example of programmed learning adapted from quote in Markle, Susan Meyer, (1969), Good Frames and Bad, 2nd edition, John Wiley & Sons, Inc., New York.

Algorithms

The algorithm, a direct descendant of the flow chart, was designed as an approach to decision-making. An algorithm itemizes all the elements involved in a decision and presents them as a series of alternative choices. The student can look at an algorithm and in one glance see all the factors that he has to consider in solving a given problem. A particular advantage is that the student need only work through the part of the algorithm that is directly related to his problem. Hence the algorithm is a particularly efficient technique. The only limitation is that it becomes unwieldy if it deals with too many decision points.

Simulation - Simulation is a simplified, operational model of an actual problem-solving situation. Simulated programs can be written, computer programmed, or acted out in "make believe" settings. The

participants become intimately involved in a situation where there is an observable outcome and, many times, a great degree of social interaction. Since most models could not duplicate all the elements of a real life situation, simulation attempts to duplicate the most essential factors and focus on them. Simulation is used in a wide variety of learning situations, from war games to astronaut training.

The use of simulation has expanded in the last few years, particularly the use of games. As a child, you probably played Monopoly, a very simple game thatinvolved you in buying and selling. Today, gaming is quite sophisticated and games are used to simulate a whole range of social situations. Games involve a fixed set of players who move toward the same goal. Each game revolves around a set of rules which provide a structure within which the actions must take place. In playing a game a participant derives insights about the basic situation and about the nature of his methods of problem-solving.

For all the excitement that simulation has generated, there are many criticisms, too. Some feel that simulation in general, and games in specific, distort the situations they are trying to simulate. Since simulation can focus only on a subset of factors, it eliminates a great deal of the complexity of real life decision-making. Certainly, this is true to a degree. In spite of this, simulations have been found to be very helpful in many teaching situations.

COMPUTER ON A PUB CRAWL

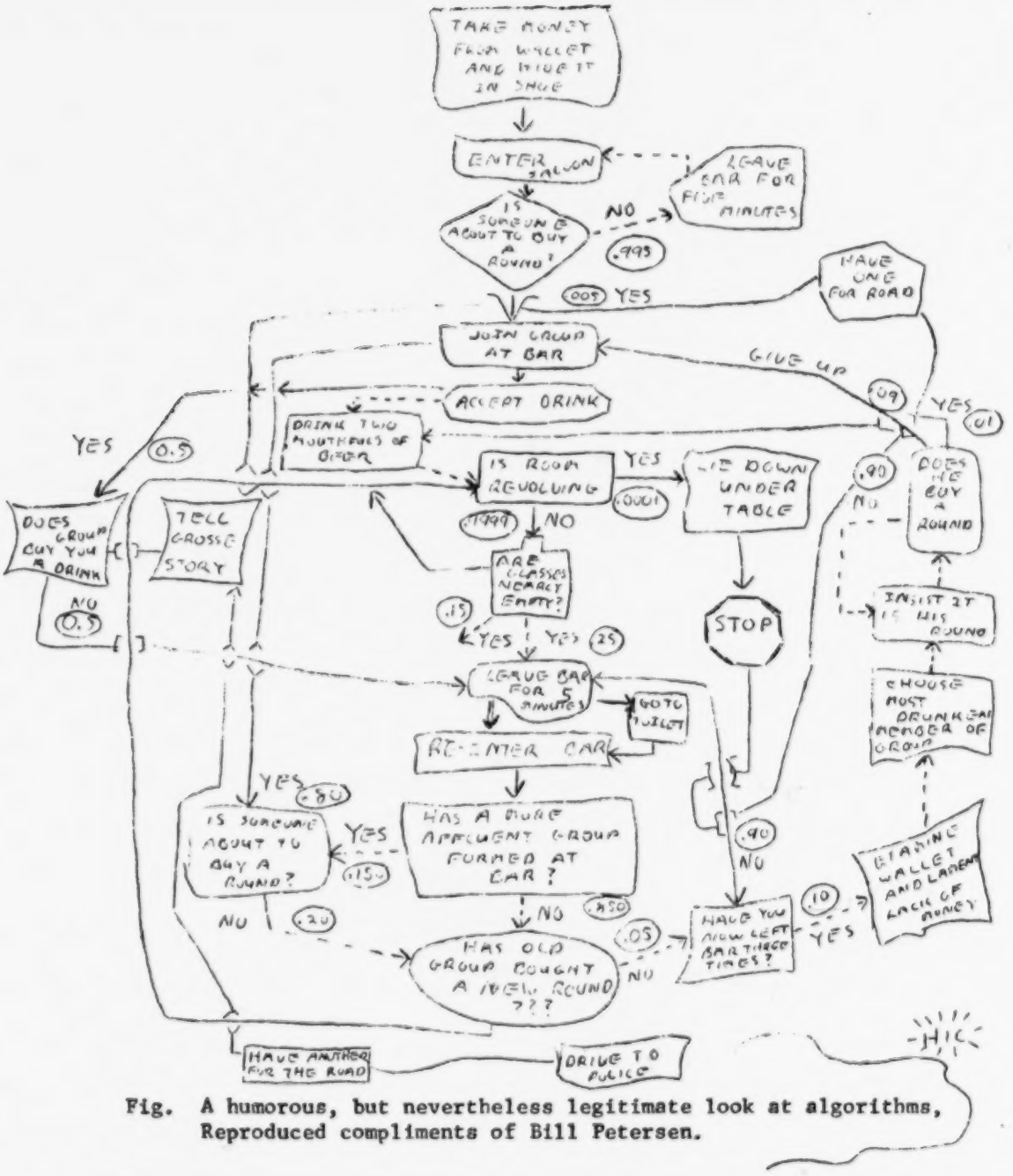

Fig. A humorous, but nevertheless legitimate look at algorithms, Reproduced compliments of Bill Petersen.

> A thirty-two-year-old man, recently discharged from the army, who has been in a car accident an hour ago, is brought by ambulance to your small country hospital fifty miles from the Metropolitan area. . . .
>
> On admission, the man is unconscious, his head and upper chest are covered with fresh blood and his extremities, lips and tongue exhibit some cyanosis. What would you do first?

Example of simulation used with British medical students. Adapted from Beard, Ruth, (1970), Teaching and Learning in Higher Education, Penguin Books, London, England.

Conclusion

This chapter has provided a brief introduction to some new teaching techniques and procedures. Hopefully, you will be interested in finding out more and in exploring the materials available in your own field.

Suggested Reading:

Beard, Ruth, (1970), Teaching and Learning in Higher Education, Penguin Books, London, England.

Gerard, Ralph, ed., (1967), Computer and Education, McGraw Hill Books, New York.

Loughary, John W., (1966), Man-Machine Systems in Education, Harper & Row, New York.

Skinner, B.F., (1958), "Teaching Machines", Science, Vol. 128, pp. 969-77.

CHAPTER 7 - A-V RESOURCES

This chapter focuses on your role in utilizing A-V materials as an integral part of instruction. Note the eight categories of A-V materials, and different reasons for using them. You will also be presented with guidelines for selecting and utilizing materials and information on campus A-V facilities.

> Media, by altering the environment, evoke in us unique ratios of sense perceptions. The extension of any one sense alters the way we think and act- the way we perceive the world
> when
> these
> ratios
> change,
> MEN CHANGE
>
> Marshall McLuhan
> The Medium is the Message

John Dewey said that an ounce of experience is worth a ton of theory. Whether you agree or disagree, this is why A-V materials are considered important: they provide that ounce. Nevertheless, many instructors fail to make full use of existing materials. Perhaps they incorrectly view A-V aids as accessories rather than as essential components of their teaching strategy. Or perhaps they see selecting materials or running machinery as just too confusing or time-consuming. You will discover for yourself that there is no special mystique about A-V materials. And, there are places for you to go and people for you to see if you need any A-V advice. In the meantime, it is important

to emphasize the many empirically-based reasons for using A-V materials in your teaching.

To begin, it is important to remember that both you and your students are bound by the limits of your own lifetime and lifespace. A-V materials help you overcome the limitations that the classroom and your own experiences impose. Through A-V resources, you are able to view phenomena that might otherwise be too small, too slow, too fast, too complex or too far away for anyone to perceive. A-V materials provide a concrete basis for conceptual thinking and they help make thinking permanent. In addition, as research has shown, students are better able to retain something that has been reinforced through the use of A-V aids. And lastly, A-V materials can motivate your students and stimulate their involvement with the subject.

There are eight basic categories of A-V materials at your disposal. They include: verbal representations, graphic representations, still pictures, motion pictures, audio recordings, programmed materials and simulated experiences. Hopefully, you will take the time to explore each of these possibilities.

A-V Materials

CATEGORIES	EXAMPLES
1. Verbal Representations	Textbooks; workbooks, projected words on films, slides and filmstrips; chalkboard notations; captions; and the output of computer consoles.
2. Graphic Representations	Charts; maps; graphs; diagrams; drawings.
3. Still Pictures	Photographs; slides; filmstrips.
4. Motion Pictures	Movies; television; videotape

5. Audio Recordings	Recordings on magnetic tape, records, or sound tracks.
6. Programs	Verbal, visual or audio sequences of information.
7. Simulations	Replicas; games; environmental happenings

Fig. Classification of A-V Materials

A-V Selection

In selecting materials, it is important to remember that there is no single, all-purpose aid that is best for every situation. Let your particular objectives determine your media choices. Selection of A-V materials cannot be made without a view to the use the resources will have. Consider your topic and the many different ways there are to illustrate it. Which way do you think would be the most effective? Once you have made this decision, there are five criteria you will want to consider in your final selection. The following guidelines are adapted from Gerlach and Ely's Teaching and Media.

-Appropriateness. Does the material suit your objectives? Does it effectively do the job you need it to do?

-Level of Sophistication. How appropriate is the material for for your students? Is it geared to their level of sophistication?

-Technical Quality. Is the quality of the material acceptable: readable? visible? audible?

Of course, you may already have a distinct media preference and have used it quite successfully. Nevertheless, try to avoid using any one medium to the exclusion of all others. And keep in mind that mixing

several media can make your lesson even more effective.*

A-V Utilization

It is essential to preview any materials that you use. The filmstrip that a friend recommends may be fine for the class he teaches and a disaster for yours. If you preview your materials, you will be able to anticipate any problems in their use. There is no substitute for really knowing your materials, their strengths and limitations. This preview period will also give you insights into how to weave the material into your lesson.

In using an A-V aid, you may first want to introduce it to the class. For example, in showing a movie, you may want to point out those ideas that you feel your students should be critically aware of in their viewing. Later you may want to reiterate these points in class discussion. Be sure to provide an opportunity for your students to give feedback on the material. They are the best judge as to whether or not a particular material facilitated their learning.

*For those interested in exploring this area further, read pp. 291-300, in Teaching and Media by Vernon S. Gerlach and Donald Ely, (1970), Prentice-Hall Inc., Englewood Cliffs, N.J.

A QUICK GUIDE TO A-V SERVICE ON CAMPUS. . .

How do you use the equipment? . . .Where can you borrow it?. . How can you get hold of materials? . . .Is it possible to have special materials produced?. . .If any of these questions are bothering you, the following guide is a helpful reference.

-A-V Campus Services provides information on available materials and equipment and arranges their scheduling. For further information, call 337-4688.

-The five A-V sub-centers, located across campus, provide production, consultative, and materials search services for the faculty members in their building.

Ballantine Hall Sub-Center.	337-6869
HPER Sub-Center	337-3981
Jordan Hall Sub-Center	337-6287
Business Building Sub-Center.	337-9688
Education Building Sub-Center	337-4743
Mitchell Hall Sub-Center	337-1403

For additional information regarding any services, call 337-2853.

Conclusion

This chapter has provided a brief introduction to the potential of A-V resources in your classroom. There is no need to feel mystified by the machines or materials. If you feel you need advice, there are any number of sources. Hopefully, you will be interested in exploring the many materials available to you.

Suggested Readings:

Dale, E., Audio-Visual Methods in Teaching, Holt, Rhinehart and Winston, New York, 1964.

Torkelson, Gerald, What Research Says to the Teacher-Instructional Media, Department of Audio-Visual Instruction, National Association, 1969.

CHAPTER 8 - EVALUATION - WHAT'S IT ALL ABOUT?

This chapter focuses on the function of evaluation and on your role as an evaluator. You will be presented with a model of evaluation as an on-going process in decision-making.

A "C"? I GOT A "C" ON MY COAT-HANGER SCULPTURE
HOW COULD ANYONE GET A "C" IN COAT-HANGER SCULPTURE
MAY I ASK A QUESTION?
WAS I JUDGED ON THE PIECE OF SCULPTURE ITSELF? IF SO, IS IT NOT TRUE THAT TIME ALONE CAN JUDGE A WORK OF ART?
OR WAS I JUDGED ON MY TALENT? IF SO, IS IT RIGHT THAT I BE JUDGED ON A PART OF LIFE OVER WHICH I HAVE NO CONTROL?
IF I WAS JUDGED ON MY EFFORT, THEN I WAS JUDGED UNFAIRLY FOR I TRIED AS HARD AS I COULD!
WAS I JUDGED ON WHAT I HAD LEARNED ABOUT THIS PROJECT? IF SO, THEN WERE NOT YOU, MY TEACHER, ALSO BEING JUDGED ON YOUR ABILITY TO TRANSMIT YOUR KNOWLEDGE TO ME? AND ARE YOU WILLING TO SHARE MY "C"?
PERHAPS I WAS BEING JUDGED ON THE QUALITY OF THE COAT HANGER ITSELF OUT OF WHICH MY CREATION WAS MADE ... NOW, IS THIS ALSO NOT UNFAIR
AM I TO BE JUDGED BY THE QUALITY OF COAT HANGERS THAT ARE USED BY THE DRY CLEANERS THAT RETURN OUR GARMENTS? IS THAT NOT THE RESPONSIBILITY OF MY PARENTS? SHOULD THEY NOT SHARE THE "C"?
"THE SQUEAKY WHEEL GETS THE GREASE"

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Evaluation is not necessarily an end-of-the-line event-something you do when the learning is done. It may be helpful to think of it in terms of the following definition: Evaluation is the systematic gathering of information for the purpose of making a decision. As an instructor, you have a constant need to see where you are, where you are going and how you are getting there. Of course, you will be interested in assessing the achievement of your students. You will also be interested in evaluating many other things. For example, how appropriate are your methods? How well are your students responding to them? Do your students enjoy your techniques? Do your students have a better idea for accomplishing some of the same goals you have set?

You will not be the only one involved in the evaluation process. Your students will be evaluating their own performance in terms of what you tell them and what they see others doing. Your class as a whole will respond, react and evaluate what goes on during class time. Your department will be anxious to know how you and your students are doing. So, you see, evaluation will be going on all the time and on many different levels.

Perhaps the following model can provide a way of thinking about evaluation. Notice that it begins with the very first statements describing the needs of your course. In a teaching situation, needs may be expressed in terms of what a student ought to know in a given subject or in terms of what he doesn't know but should. Needs may also be expressed in terms of the particular skills or abilities that the beginning student lacks but which are desirable at the course conclusion.

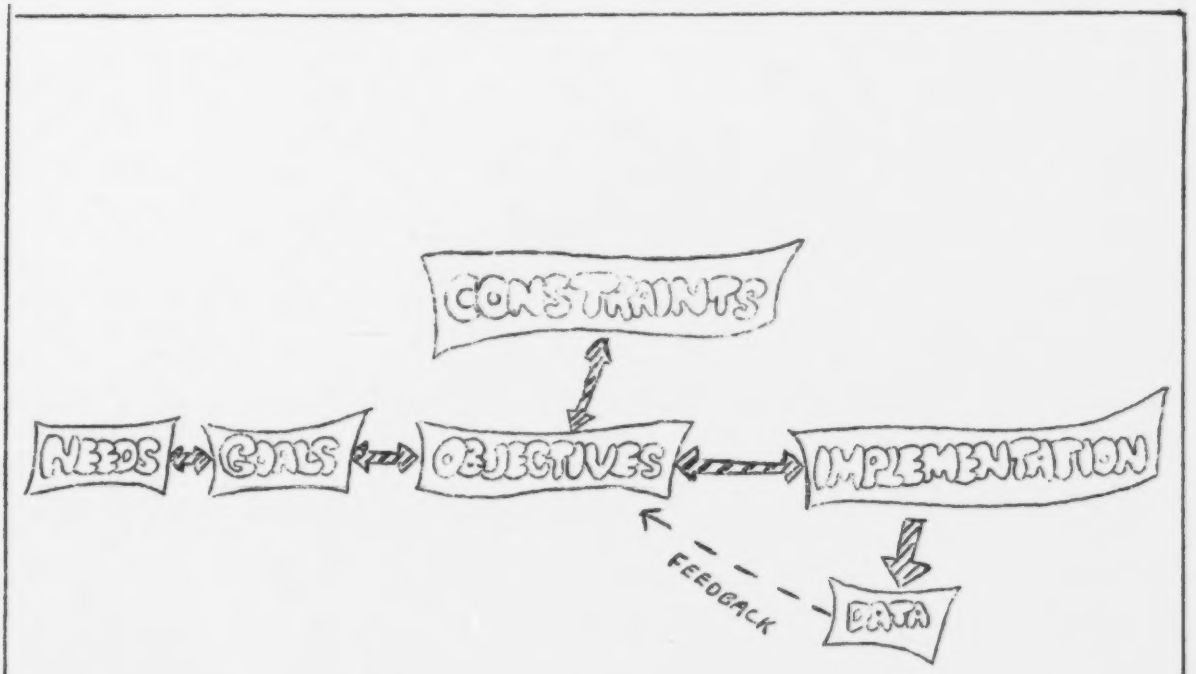


Fig. A model of a decision-making process.

Once the needs are known, the next step in evaluation is to consider broad goals that correspond with the needs. These goals should be comprehensive enough so that when they are achieved, the needs will be eliminated. A goal in a particular course, for example, might be that students learn about photosynthesis. This goal statement provides direction in course content, but it doesn't specifically state how your students will demonstrate what they have learned.

The next step in evaluation is to specify objectives which state exactly what it is the student will be required to do and what criteria will be used to evaluate him. When objectives are stated properly, (see Chapter 1 - Writing Objectives) they provide both you and your students with a clear-cut sense of where you are going. Objectives also reflect a sensitivity to the constraints inherent in a given

teaching situation. When you write your objectives, you need to consider your students' particular needs and all the limitations of time and resources.

Once objectives have been specified, appropriately reviewed by your colleagues, and found to represent the best professional opinion about what students ought to know, the next step is to try teaching toward them. This is the implementation stage of our evaluation model.

Whether or not the implementation stage of our evaluation model is effective is the crucial issue in evaluation. You are concerned with the question, "Does it work?". The only way to effectively answer this is to gather information about this implementation. This is the all-important feedback stage. The feedback you receive from your data should be specific to the objectives. You want to find out whether your students have achieved the objectives, either all or in part, so that you can make decisions as to whether they should be modified. You may find that your objectives are inappropriate. Possibly they are too easy, too hard, too many or too few. Remember, the data you gather do not have to be "hard data" in the ordinary research sense. To be sure, your data may be information you have gathered from paper and pen tests, but just as important, they could be personal statements, feedback from students, videotape observation of the classroom setting, or the simple awareness from eye-to-eye contact with your students.

Conclusion

To sum up, the purpose of evaluation is to help you gather information

for better decision-making. As part of evaluation, you will first want to determine what needs should be attended to. Second, you will want to specify in broad terms what goals eliminate needs. Third, you will want to write objectives specific to your goals, keeping in mind the realistic constraints that operate on you as an instructor. Fourth, you will want to implement your objectives. Fifth, you will need to gather information which will provide you with some bases for making decisions to modify, maintain or eliminate your objectives. Throughout this process, you will be involved in getting and giving feedback, in becoming more attuned to your students' needs so that your teaching can better meet them.

Suggested Readings:

Ebel, A.L., Measuring Educational Achievement, Prentice Hall, Inc., Englewood Cliffs, N.J., 1965.

Popham, James W. and Baker, Eva L., Systematic Instruction, Prentice Hall, Inc., Englewood Cliffs, N.J., 1970, 129-47.

CHAPTER 9 - A FEW TIPS ON TESTING

This chapter focuses on the purposes and problems of classroom testing. Note the different types of testing that are identified and the guidelines for writing, preparing and scoring tests. You will also find a discussion on scheduling problems. This chapter stresses the importance of the role you play in creating a climate for testing.

The following are sample examination questions from unidentified campuses across the country. Reprinted from "Capital M", a publication of MENSA, 50 East 42nd Street, New York, N.Y. 10017.

SOCIOLOGY: Estimate the sociological problems that might accompany the end of the world. Construct an experiment to test your theory.

BIOLOGY: Create life. Estimate the differences in subsequent human culture if this form of life had been developed 500 million years ago, with special attention to the probable effect on the English parliamentary system. Prove your thesis.

ENGINEERING: The disassembled parts of a high powered rifle have been placed in a box on your desk. You will also find an instruction manual printed in Swahili. In 10 minutes a hungry Bengal tiger will be admitted to the room. Take whatever action you feel appropriate. Be prepared to justify your decision.

POLITICAL SCIENCE: There is a red telephone on your desk. Start World War III. Report at length on its socio-political effects, if any.

EPISTEMOLOGY: Take a position for or against truth. Prove the validity of your position.

MUSIC: Write a piano concerto, orchestrate and perform it with flute and drum. You will find a piano under your chair.

EDUCATION: Develop a fool-proof and inexpensive system of education that will meet the needs of all segments of society. Convince both the faculty and rioting students outside to accept it. Limit yourself to the vocabulary found in the Dick and Jane Reading Series.

MEDICINE: You have been provided with a razor blade, a piece of gauze, and a bottle of Scotch. Remove your appendix. Do not suture your work until it has been inspected. You have 15 minutes.

> Written words with written answers are "tests," "quizzes" or "examinations." Horrible words. My soul sickens at their very sound. I sat through so many scores of them, and I have marked so many hundreds of them. Yet I have never been able to think of a substitute and have yet to meet anyone else who has.
>
> Gilbert Highet
>
> The Art of Teaching

Perhaps you agree with Highet. The very thought of taking tests, much less making them, churns your stomach a little. But keep in mind that the process doesn't have to be painful. There are many ways to assess your students knowledge and a written test is only one alternative. Depending on your skill and sensitivity, it can be a very important one.

When the time comes to design a test, you may be happy that you invested some effort in writing goals or objectives to help you and your students understand what's important and where you all want to go. Your objectives will provide you and your students with a special list of the areas you want to test and the criteria you'll be using. When students understand the purpose and goals of the class, they won't waste time wondering what content and competencies are important.

Testing enables you and your student to know whether or not you have gotten where you want to go. It also serves several other functions as well. Tests help you diagnose where the problems are, whether they're with your students' style of learning or your own style of teaching.

They provide you with clues for evaluating your own methods. And while it is almost a classroom cliche, a well-written test really can be a learning experience in itself, not just a measure of what has been learned. It gives your students a chance to organize and integrate material, to apply it in new ways.

There are several test categories to work with and depending upon your special needs, you may find one type particularly appropriate. In general, tests can be divided into two very broad classifications, open book and closed book. The terms refer to the students' use of reference materials during the test. An open book exam has an obvious advantage in cutting down your students' anxiety. It also simulates a real life situation, in that your students would have resources that would normally be at their disposal. But the argument for a "real life" testing situation can be used for closed book tests as well. Closed book tests force the students to make quick decisions. What professional has the time to continually chase back to his library?

In addition to these basic divisions, there are further categories for test situations. You are probably already familiar with essay, structured response and restricted response questions. You can use these forms to deal with a variety of objectives. Essay tests measure the student's ability to organize, synthesize and apply information. Essays provide a change for your students to demonstrate their problem solving ability. Structured response tests (multiple choice, true-false and matching) give you the opportunity to break down a complex idea into its component parts. If you can test a student on each aspect of an

idea, you have a better chance of diagnosing where his problems, if any, are. The responses are "structured" in the sense that you provide all the options: you structure the way the student looks at the problem. And lastly, restricted response tests (completion and short answer) deal with highly specific bits of information. They are useful when you need to pinpoint exactly what a student knows.

No matter what format you choose, it will be helpful to have some basic guidelines in mind as you write, prepare and score the test. Your own experiences as a test taker, with years of biting fingernails and gnashing teeth, should give you an extra helping of insight into what makes a "good" test.

Writing the test

In writing your test, keep in mind that your students' scores should reflect how well they can accomplish the task, not how well they can decipher your questions. Write your questions in such a way that the task is clear and unambiguous. If necessary, you may want to test your questions on other instructors to see if their interpretation is what you intended. Such trial runs can save you and your students a great deal of agony. Remember to check your questions against the course and unit objectives. You don't want to spend class time emphasizing one thing and then test another. Surprisingly, many instructors are guilty of this. Also, avoid the temptation to try to catch your students with "trick" questions that are either stated in an intentionally confusing way or deal with obscure items of information. Nothing appropriately

aggravates students more. There are many ways that you can test your students without doing this.

Perhaps the main concern in test writing is to avoid giving any unintentional clues in your questions. Test taking has always had an element of sport. The really test-wise student can use these clues to great advantage, gaining credit for knowledge that he really doesn't have. You probably won't have any trouble recognizing the following clues and maybe you have a few of your own to add to the list.

--Beware of the use of what are called "specific determiners". (e.g. all, always, never). Any second grader assumes that a broad generalization is usually false. In contrast, those statements that are qualified (e.g. sometimes, maybe, under certain conditions) seem more likely to be true.

--Avoid ambiguous terms. Many expressions are open to interpretation and may throw the student off the track. (e.g. in most cases, frequently, to a considerable degree.)

--Recognize that the length of your true-false or multiple choice questions may give clues. Research indicates that length is often a clue for students. The longer a multiple choice option, the longer the true-false question, the more likely it seems to be true.

--Avoid the use of negatively stated questions or double negatives in your questions. It takes more time for your students to read this sort of question and sort through what you are trying to ask. This sort of question really falls into the trick category that was mentioned

earlier.

--Beware of the use of "all of the above", "some of the above", "none of the above." (check one)

Preparing the Test

Once you have finished the task of writing the test, there are still a number of points to consider in putting it together. First of all, you will want to arrange the questions according to their type (for example, put all multiple choice items together, etc.). Different types of questions require special skills and sets of directions, so this simplifies things for both you and your students. Also check and double check to see that the test doesn't have too many or too lengthy questions. And lastly, be sure to write a general set of directions for the test. Specify the form the answers should take, the criteria on which they will be judged and the scoring system. By indicating how many points the questions are worth, you help the student decide how to best allocate his time.

Scoring the Test

Scoring the test involves a great deal more than x-ing all the wrong answers in red pencil. Be sure to prepare an answer guide for yourself, whether the questions are objective or essay. If they are essay questions, jot down the points you will be looking for in student answers. You may also want to give your students copies of the answer guide as they leave the room. This practice reinforces the correct answer while the material is still fresh. This idea may be impractical

in some situations. In any event, be sure to discuss the test thoroughly when you hand it back and if possible, hand out some sort of answer guide as a permanent record. As one alternative in scoring essay exams, read all the answers to one set of questions before going on to the next. This way, a student's performance on one question doesn't influence your grading of the next one. After correcting one set of questions, you may want to reshuffle the papers before scoring the next. If you are grading essays for their development as well as their factual accuracy, you ought to grade these areas separately. This will indicate to the student whether his weaknesses have been in the content, the expression, or both. Many students rightfully resent writing lengthy essays and getting nothing in return except a grade, perhaps a very general comment and an occasional spelling correction. Specific marginal comments to students' statements are most welcome. This sort of exchange is an integral part of the learning process and can provide the basis for further class disucssion.

And as one final note, try to hand back the tests as soon as possible. This shows the class that they are high on your list of priorities.

Scheduling the Test

You will also be concerned with the timing of your tests. Is it better to give short, frequent tests or longer, more comprehensive ones? There is no set rule; the only guideline is that it shouldn't be possible to flunk the course on the basis of any one grade. There are advantages to both frequent and less frequent testing and you will want to weigh the advantages of both. Frequent testing is helpful in that

it tends to even out study efforts; it provides continual feedback to the student on what he is doing and it reduces the subject matter to manageable units. But less frequent testing also has points in its favor. It helps prod the student to organize and synthesize the subject matter and such a synthesis helps your students retain the material for longer periods.

In any event, you may decide that you don't want to make this choice by yourself and that your students should play a part in this sort of decision making. In that case you can alert them to the options and have them set their own schedule.

Conclusion

The real problem isn't just in making or taking the test, although that can be painful enough. The deeper concern is whether testing will disturb the balance of classroom interaction. As Carl Rogers stated in Freedom to Learn, "A student is not free from evaluation to the extent that the instructor withholds it. He is free from it to the extent that he can accept himself as a person."

You have a great deal to do with creating a climate for testing. Your attitude can make a student feel that the evaluation concerns his work and not his absolute worth.

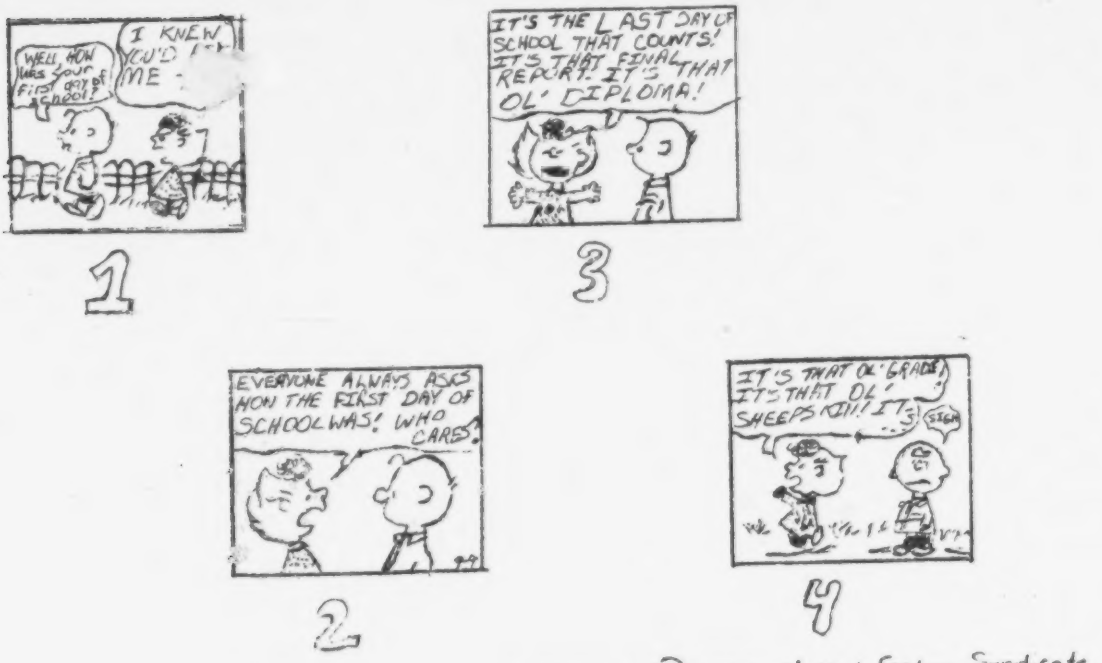
SUGGESTED READINGS:

Adkins-Wood, D., Test Construction, Charles E. Merrill, Columbus, Ohio, 1960.

Ebel, A. L., Measuring Educational Achievement, Prentice Hall, Inc., Englewood Cliffs, N. J., 1965.

CHAPTER 10 - THE FIRST CLASS

This chapter focuses on the first class session and helps you understand how it sets the tone for the semester. You will be presented with a number of tips for making that first class run more smoothly.


WELL, HOW WAS YOUR FIRST DAY OF SCHOOL?
I KNEW YOU'D ASK ME
1
IT'S THE LAST DAY OF SCHOOL THAT COUNTS! IT'S THAT FINAL REPORT! IT'S THAT OL' DIPLOMA!
3
EVERYONE ALWAYS ASKS HOW THE FIRST DAY OF SCHOOL WAS! WHO CARES!
2
IT'S THAT OL' GRADE! IT'S THAT OL' SHEEPSKIN! IT'S
SIGH
4

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There is no doubt about it, this first class is important. Your students will be trying to read you and decipher what you and your course are all about. Perhaps you have had the experience of trying

to "psych" a professor out during the first couple of classes. You may have even felt that understanding his eccentricities was more important than understanding the course content. Now you are on the other side and your students will be listening closely to what you say and how you say it. These first impressions are important. In many ways they set the tone for what will happen the rest of the semester.

The first day is usually taken up with a lot of housekeeping details. Do not be fooled into thinking that they are trivial. The things you do now can do a great deal to make you and your students feel more at ease. You can almost be sure that a few strays will have wandered into your class, so you will want to begin by writing your own name, class name and number on the board. After this, you may want to write down your office, phone number and office hours. Until your students get a sense of what you are like, some may be too shy to speak up in class. Office hours may prove a crucial way of reaching students you otherwise would not hear from. With this in mind, try to set your office hours at staggered times, so you will be accessible to as many students as possible. You may also want to emphasize that additional appointments can be made if necessary. Even with this, you cannot be sure that your students will feel free to come in. But at least you will be giving them cues as to your own interest and involvement.

The first class is also the time to let your students know what they can expect from you and the course. Obviously, they are more likely

to live up to your expectations if they have a clear idea as to what they are. Be sure to explain your policies on grading, homework, absences, etc. You may also want to let them know a little bit about your teaching style. Do you want them to take careful notes or will jotting down the main points be sufficient? Do you feel lecturing is important for your particular subject, or do you emphasize class discussion? As a new instructor, you may not feel secure enough in your own style to describe it. Nevertheless, any hints that you can give your students will be helpful.

Now is also the time to give your students a perspective of the material they will cover. In addition to the traditional course syllabus, you might want to hand out a list of your objectives for the course. Together they will serve as useful references for your students. You may also need to discuss in greater detail how the main course topics relate to one another. And since perspective is the key, you may want to fit your course into a larger context and explain how it relates to other courses in the field.

As one last point, and perhaps you will want to ask them how they see themselves as students and how they view your own role as instructor. In turn, you may want to share your own impressions and expectations. This sort of exchange can be the beginning of a very important sort of sharing. It also lets the student know that his own commitment is crucial to what will go on.

Conclusion

> "Where will I begin, please your Majesty?," she asked.
> "Begin at the beginning," said the King very gravely,"and
> go till you come to the end: then stop."
>
> Lewis Carroll
> Alice's Adventures in Wonderland

Good luck!

Suggested References

Adkins-Wood, D. (1960) Test Construction, Columbus, Ohio: Charles Merrill.

Bloom, J.S. (1965) The Process of Learning, Cambridge, Massachusetts: Harvard University Press.

Bruner, J.S. (1965) The Process of Learning, Cambridge, Massachusetts, Harvard University Press.

Dale, E., (1964) Audio-Visual Methods in Teaching, New York: Holt, Rhinehart and Winston.

Davies, Ivor K. (1969) The Management of Learning, London, England: McGraw Hill.

Ebel, A. L. (1965) Measuring Educational Achievement, Englewood Cliffs, New Jersey: Prentice Hall.

Gagne, R.M. (1965a) The Conditions of Learning, New York: Holt, Rhinehart and Winston.

Gerard, Ralph, Ed., (1967), Computer and Education McGraw Hill Books, New York

Gerlach, Vernon S. and Ely, Donald P. (1971) Teaching and Media, Englewood Cliffs, New Jersey: Prentice Hall.

Krathwohl, D.R., Bloom, B.S. and Masia, B.B. (1964) Taxonomy of Educational Objectives, Handbook II: Affective Domain, New York: McKay

Loughary, John W., (1966), Man-Machine Systems in Education, Harper & Row, New York.

Mager, Robert F. (1962) Preparing Objectives for Programmed Instruction San Francisco: Fearon Publishers.

Payne, David A. (1968) Specification and Measurement of Learning Outcomes, Waltham, Massachusetts: Blaisdell.

Popham, W. James and Baker, Eva L. (1970) Establishing Instructional Goals, Englewood Cliffs, New Jersey: Prentice Hall.

Planning Instructional Sequences. Englewood Cliffs, New Jersey: Prentice Hall. (1970).

Phillips, Gerald, Communication and Small Groups, Bobbs-Merrill Indianapolis, 1966.

Potter, David, (1969), Discussion: A Guide to Effective Practice, Belmont, California: Wadsworth

Skinner, B.F., (1958), "Teaching Machines", Science, Vol: 128, pp. 969-77.

Thelen, H. (1954), Dynamics of Groups at Work, Chicago: University of Chicago.

Unwin, D. ed. (1969), Media and Methods: Instructional Technology in Higher Education.

Weigand, James E. (1971), Developing Teacher Competencies, Englewood Cliffs, New Jersey: Prentice Hall.

Wittich, W.A. and Schuller, C.F., (1968), A-V Materials. Their Nature and Use, New York: McGraw Hill.